WHAT IS CLAIMED IS:

1. A rotor for a piezoelectric drive, comprising:

a rotor body of a first material, and having a friction surface of a second material different from said first material and comprising semi-crystalline thermoplastic polymer with filler, which does not lose a significant amount of strength or start to melt when exposed to ultrasonic fields typically used in piezoelectric drives, said body and friction surface configured and dimensioned to cooperate with a stator, pushers, and piezoelectric oscillator in a piezoelectric drive, with pushers operatively engaging said friction surface.

2. A rotor for a piezoelectric drive as recited in claim 1 wherein said friction surface has a mechanical quality factor of less than about 200, has an ultimate tensile strength of at least about 140 Mpa, and has an effective life of at least about 6000 hours of operation in a piezoelectric drive.

3. A rotor for a piezoelectric drive as recited in claim 1 wherein said body friction surface consists essentially of about 30-60% by weight semi-crystalline thermoplastic polymer and about 40-70% by weight filler.

4. A rotor for a piezoelectric drive as recited in claim 3 wherein said body is injection molded of a polymeric material less expensive than polyarylamide, and wherein said semi-crystalline thermoplastic polymer comprises polyarylamide, and wherein said filler is selected from the group consisting primarily of particles of glass, fiberglass, particles or fibers of oxide ceramics, metals, carbon, or graphite, and combinations thereof.

5 A rotor for a piezoelectric drive as recited in claim 1 wherein said body is of molded aluminum alloy, or a like material having high heat conductivity so as to serve as a heat sink.

6. An elastic pusher for a piezoelectric drive, comprising:

an elastic pusher body comprising semi-crystalline thermoplastic polymer with filler, which does not lose a significant amount of strength or start to melt when exposed to ultrasonic fields typically used in piezoelectric drives, said body configured and dimensioned to cooperate with a stator, rotor, and piezoelectric oscillator in a piezoelectric drive.

7. An elastic pusher as recited in claim 6 wherein said pusher body consists essentially of semi-crystalline thermoplastic polymer with filler, and has a Q factor of less than about 100.

8. An elastic pusher for a piezoelectric drive as recited in claim 6 wherein said pusher body consists essentially of about 30-60% by weight semi-crystalline thermoplastic polymer and about 40-70% by weight filler, and has an ultimate tensile strength of at least about 140 MPa.

9. An elastic pusher for a piezoelectric drive as recited in claim 6 wherein said pusher body is injection molded and elongated in a dimension, and comprises a polymer with at least 10% by weight fibers substantially oriented in the dimension of elongation of said pusher body.

10. An elastic pusher for a piezoelectric drive as recited in claim 6 wherein said body is of the same material as and integral with a ring and a plurality of other pushers all extending radially from said ring; and wherein said ring is dimensioned and configured to fit on or in a piezoelectric oscillator.

11. An elastic pusher for a piezoelectric drive as recited in claim 10 wherein said ring is press fit onto orinto, adhesively attached to, or molded onto or into, said piezoelectric oscillator.

12. An elastic pusher for a piezoelectric drive as recited in claim 6 having an effective life of at least about 9000 hours of operation in a piezoelectric drive when cooperating with a rotor body having a friction surface comprising semi-crystalline thermoplastic polymer with filler, which does not lose a significant amount of strength or start to melt when exposed to ultrasonic fields typically used in piezoelectric drives.

13. An elastic pusher for a piezoelectric drive as recited in claim 8 wherein said semi-crystalline thermoplastic polymer comprises polyarylamide.

14. An elastic pusher for a piezoelectric drive as recited in claim 6 wherein said pusher body comprises a plurality of plates connected together, at least some of the plates having oriented fibers in the dimension of elongation thereof, and wherein said pusher is connected to a holder along with a plurality of like pushers, by crimping, adhesive, soldering, or welding.

15, A piezoelectric drive comprising:

a stator;

a first piezoelectric oscillator

a first rotor with a friction surface comprising semi-crystalline thermoplastic polymer with filler, which does not lose a significant amount of strength or start to melt when exposed to ultrasonic fields typically used in piezoelectric drives;

a driven element operatively connected to said first rotor; and

a plurality of elastic pushers cooperating between said first rotor friction surface and first oscillator, to move said driven element in a first direction with respect to said stator upon actuation of said piezoelectric oscillator, said pushers comprising semi-crystalline thermoplastic polymer with filler, which does not lose a significant amount of strength or start to melt when exposed to ultrasonic fields typically used in piezoelectric drives.

16. A piezoelectric drive as recited in claim 15 wherein the material of said pushers has a mechanical quality factor of less than about 100, and has an ultimate tensile strength of at least about 140 Mpa, and comprises about 30-60% semi-crystalline thermoplastic polymer and about 40-70% filler.

17. A piezoelectric drive as recited in claim 15 further comprising:

a second piezoelectric oscillator;

a second rotor with a friction surface;

a plurality of elastic pushers cooperating between said second rotor and second oscillator, to move said driven element with respect to said stator upon actuation of said second piezoelectric oscillator;

said rotors operatively connected so that actuation of said first and second piezoelectric oscillators, respectively, moves the driven element in opposite first and second directions; and

wherein said second rotor friction surface and said plurality of pushers, comprise semi-crystalline thermoplastic polymer with filler, which does not lose a significant amount of strength or start to melt when exposed to ultrasonic fields typically used in piezoelectric drives

18. A piezoelectric drive as recited in claim 17 wherein said driven element is a shaft, and wherein said rotors are operatively connected to a pointer of an analog instrument, said pointer mounted on said shaft, which shaft is rotatable clockwise or counterclockwise.

19. A piezoelectric drive as recited in claim 18 further comprising an angular position sensor which operatively senses the position of said shaft, and an environmental condition sensor operatively connected to said angular position sensor, and operatively connected to said piezoelectric oscillators to control operation thereof to move said pointer clockwise or counterclockwise in response to a sensed environmental condition.

20. A piezoelectric drive as recited in claim 15 wherein said first rotor is operatively connected to a driven mechanical element excluding a pointer.

21. A piezoelectric drive as recited in claim 15 wherein said driven element includes a time measuring hand.

22. A piezoelectric drive as recited in claim 20 wherein said first rotor including said friction surface thereof is injection molded of about 30-60% by weight semi-crystalline thermoplastic polymer and about 40-70% by weight filler.

23. A rotor for a piezoelectric drive as recited in claim 22 wherein said semi-crystalline thermoplastic polymer comprises polyarylamide.

24. An instrument comprising:

a piezoelectric drive comprising: a first stator, a first piezoelectric oscillator, a first rotor, and a first plurality of elastic pushers cooperating between said first rotor and first oscillator; and a second piezoelectric oscillator, a second rotor, and a second plurality of elastic pushers cooperating between said second rotor and second piezoelectric oscillator;

a shaft operatively connected to said first and second rotors;

said rotors operatively connected so that actuation of said first and second piezoelectric oscillators, respectively, moves said shaft in opposite first and second directions; and

an environmental condition sensor operatively connected to said piezoelectric oscillators to control operation thereof to move said shaft in said first or second directions in response to a sensed environmental condition.

25. An instrument as recited in claim 24 comprising an analog instrument; and further comprising a pointer mounted to said shaft for movement therewith, and a scale which said pointer moves relative to.

26. An analog instrument as recited in claim 25 further comprising an angular position sensor which operatively senses the position of said shaft and operatively connected to said environmental condition sensor.

27. An analog instrument as recited in claim 26 wherein said first and second rotors comprise bodies each having a friction surface of at least about 30% by weight semi-crystalline thermoplastic polymer with filler, and have an effective life of at least about 6000 hours of operation.

28. An instrument as recited in claim 24 wherein said pushers comprise about 30-60% by weight semi-crystalline thermoplastic polymer and about 40-70% by weight filler, and have an ultimate tensile strength of at least about 140 MPa